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TYPE II PROGRESS REPORT - NUMBER 2

Period: June 7, 1975 to September 7, 1975

EXTENSIVE INVENTORY OF FOREST RESOURCES

BY MULTISTAGE SAMPLING

GSFC Identification Number 2306A

Contract Number S-54053A

Report date - September 18, 1975

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Extensive Inventory of Forest Resources
by Multistage Sampling

GSFC Identification Number 2306A

Principal Investigator: Robert C. Aldrich

Coinvestigators: Robert W. Dana
Edwin H. Roberts

STATEMENT OF PROBLEMS:

1. High-altitude color infrared photography taken on May 8, 1975, was received in August. However, due to the poor quality of the reproductions, we had to return the imagery to ASCS, Western Laboratory, Salt Lake City, for reprocessing.

2. We have advertised through the Civil Service Commission for a permanent GS-9 Computer Programmer. The closing date was August 21, and we hope to be able to fill this vacancy within a short time. As reported in our Type II report of June 13, this position has been open for over 4 months and has seriously slowed our progress.

3. We are planning to make two types of solar and atmospheric corrections regarding signature extension in computer-aided classifications. The first is a temporal correction between two or more dates of LANDSAT coverage where the scenes are the same or are composed of similar reflective signatures. The second type is a locational correction between geographical locations on a single LANDSAT frame. The latter correction is to correct for topocscale or mesoscale variations in atmospheric parameters.

The temporal corrections are most useful during seasons of limited phenological change. For forest areas, these would be August to September or the period from January to March. The locational corrections might prove useful at any time.

The locational corrections require use of the planned four-band radiometer to rapidly acquire data at several points of the test area before significant changes in sun angle occur. Due to delays in hiring personnel and in delivery of components, the airborne radiometer probably will not be ready in October as planned. If this is the case, ground radiance measurements will be taken in Virginia on or about October 23 to

define the solar and atmospheric conditions for this important LANDSAT coverage date. Four-band radiometer flights will be rescheduled in the winter and spring of 1976.

ACCOMPLISHMENTS:

A comprehensive Work Study Plan has been written that outlines the procedures, work flow, responsibilities, and time schedule to complete the contract requirements.

Photo Interpretation, Mapping, and Photogrammetry:

1. LANDSAT-1 bulk photographic data for scenes 1080-15192 and 1080-15194, October 11, 1972, were combined and enhanced by a commercial photographic laboratory. False-color enlargements at scales of 1:125,000 and 1:250,000 were made from color internegatives and will be used in our analysis. Map overlays including county boundaries and 10,000-meter UTM coordinate intersections have been drawn and will be reproduced to the scale of the LANDSAT enlargements.

2. LANDSAT-2 bulk photographic data was received for scenes 2112-15074 and 2112-15081, May 14, 1975. The data have been combined and enhanced on an I²S viewer and color internegatives made for producing both color transparencies and color prints. The bulk data will also be combined by a commercial laboratory for a comparison of systems.

3. 1 472 forest inventory plot locations in the nine-county area have been located on 1:24,000 7½-minute quadrangle map sheets. A Zoom Transfer Scope was used to accurately transfer the points from 1:20,000 scale aerial photographs to the maps. The grid coordinates of all plots have been read with a Numonics Corporation Graphics Calculator recorded on computer cards, and converted to UTM coordinates. We will use the coordinates to locate corresponding pixels in the LANDSAT CCT's later in the experiment.

4. A 16-point cluster grid overlay has been designed and reproduced to overlay LANDSAT 1:125,000 scale enlargements for photo interpretation. Proportions will be computed for each Level I land class in each cluster and used as a continuous variable to compute mean proportions in each county. Regressions will be developed from subsamples on high-altitude CIR and the ground to adjust the LANDSAT forest area base.

Computer Analysis, Mapping, and Photogrammetry:

1. Computer compatible tapes have been received for scenes 1080-15192 and 1080-15194 (October 11, 1972) and scenes 2112-15074 and 2112-15081 (May 14, 1975).

2. There is no further progress to report at this time. As reported elsewhere in this report, we are presently recruiting a computer programmer to assist in this work.

Data Standardization and Quantification:

1. A study was made of the LANDSAT MSS scanner spectral responses. Data from Goddard Space Flight Center (GSFC) covering the six channels per band of the prototype and backup scanners were used. The GSFC-furnished bandwidths at the half-power points were averaged to give the following mean values in nanometers:

	<u>LANDSAT</u>	<u>MSS BAND</u>			
		<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
1	494-598	604-700	693-799	808-987	
2	497-599	606-709	695-801	805-989	

2. The LANDSAT 2 mean bandwidths were chosen for our four-band airborne radiometer now under development. Taking into account the spectral response of the silicon photodiode sensors we specified bandwidths within 5 nm of these values. Three sets of filters for bands 4, 5, and 6 were ordered from the lowest of four bidders.

3. Filters for band 7 were salvaged from radiometers constructed for a previous LANDSAT-1 (ERTS-1) contract. However, the filters for the other three bands were degraded beyond use due to harsh environmental conditions during extended field applications and had to be replaced.

4. Amplifiers and power supplies have been acquired and breadboard work on the four-band radiometer is proceeding. The field power supply for ground-based radiometry has been modified for lighter weight rechargeable batteries and for better voltage control.

Aircraft and Ground Data Acquisition:

There is nothing to report at this time.

SIGNIFICANT RESULTS:

There are no significant results to be reported at this time.

PUBLICATIONS:

There are no publications to be reported at this time.

RECOMMENDATIONS:

There are no recommendations to be made at this time.

FUNDS EXPENDED: \$14,086.07

DATA USE:

	<u>Value of Data Allowed</u>	<u>Value of Data Ordered</u>	<u>Value of Data Received</u>
ASCS (A/C Imagery)	\$1,500.00	0	0
ASCS (LANDSAT Imagery)	300.00	140.00	140.00
EDC ,CCT's)	2,400.00	400.00	400.00